Consumption of Black Raspberries Altered the Composition of the Fecal Microbiome in Mice Fed a Western Type Diet (OR04-01-19)

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Objectives: Dietary strategies to reduce colonic inflammation and promote gut homeostasis may markedly reduce the risk of colitis-associated colorectal cancer. Previously, we showed that dietary supplementation with black raspberries significantly suppressed colitis and colon tumorigenesis promoted by the consumption a Western type diet in mice. In this study, our goal was to assess the impact of consumption of the TWD with and without black raspberry supplementation on the composition of the fecal microbiome over the course of disease development.

Methods: C57BL/6 J male mice were fed a standard diet (AIN93G), the total Western diet (TWD), TWD + 5% (w/w) black raspberry powder (BRB) or TWD + 10% (w/w) BRB for 16 weeks total. After two weeks of feeding test diets, all mice were dosed with axozymethane and provided 1% dextran sodium sulfate in drinking water for 10 days to promote colonic inflammation and tumorigenesis. Composition of the fecal microbiome was determined by standard 16S rRNA sequencing following two weeks of dietary treatment, during active colitis immediately following DSS treatment and again two weeks later during the recovery period.

Results: Fecal microbiome profiles in mice fed diets supplemented with 5 or 10% BRB were distinct from those fed AIN93G or TWD diets, shown by significant differences in beta diversity at each of the time points (unweighted unifrac distance, permanova $P < 0.01$). During active colitis, alpha diversity was significantly reduced in mice fed TWD + 10%BRB compared to TWD-fed positive controls (Chao1, $P = 0.04$; Shannon, $P = 0.006$). Also of interest, LEfSe analysis identified bacteria families *Bifidobacteriacea (Bifidobacteriumpseudo-longum*), *Streptococcaceae* (genus *Lactococcus*), and *Turicibacteraceae* (genus *Turicibacter*) as discriminating taxa for mice fed TWD with BRB supplementation compared to those fed TWD. Also during colitis, both *Bifidobacteriaceae* and *Turicibacteraceae* families also distinguished TWD + BRB groups from mice fed AIN93G diet, whereas *Verrucomicrobiaceae* (*Akkermansia muciniphila*) distinguished TWD-fed mice from AIN93G negative controls.

Conclusions: Consumption of BRB at diet-relevant concentrations altered the composition of the gut microbiome in favor of some known health-promoting bacteria, a change the may explain the suppression of colitis and colon tumorigenesis previously observed.

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